

PC 99 System Design Guide

Version 0.9 Review Draft

**A Reference for Designing
PCs and Peripherals for the
Microsoft® Windows Family of
Operating Systems**

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Preface

Thank you for your interest in the Version 0.9 review draft of the proposed requirements and recommendations for *PC 99 System Design Guide*.

Please use the forms in the Word download package to provide comments on Version 0.9.

In preparing your comments, please remember that not all requirements take effect on July 1, 1999. If you cannot comply with a proposed requirement by July 1, 1999, please provide information about when you believe compliant components can be implemented in your production line. If you have previously submitted comments about your company's or the industry's inability to comply with requirements in these guidelines, please resubmit your comments if changes in Version 0.9 do not address your concerns.

Schedule. The following deadlines are planned for the PC 99 review process:

- **By July 10: Final comments due**
- By July 20 (est.): Version 1.0 posted on PC 99 web sites

The complete design guide text will be published in book form by Microsoft Press later in Q3 1998.

For up-to-date information about the PC 99 draft and review process, see:

<http://www.microsoft.com/hwdev/pc99.htm>

<http://developer.intel.com/design/desguide/>

Please note that all mail received at these aliases is shared among the co-authors at Intel and Microsoft. The co-authors request that only one individual per division in each company register and submit review comments.

Again, thank you for your interest and time in reviewing these proposed changes. Your extensive contributions have been invaluable in preparing these guidelines.

— The PC 99 co-authors at
Intel Corporation and Microsoft Corporation

Version 0.9 Executive Summary

The following summarizes the key changes proposed for PC 99, in comparison to the requirements and recommendations defined in *PC 98 System Design Guide*.

PC 99 Proposed General System Requirements

CHANGED FOR V.0.9

- **System performance.** 300 MHz processor with 128K L2 cache, plus 32 MB RAM for Consumer PCs and 64 MB RAM for Office PCs.
- **ACPI and BIOS support.** Clarifications to ACPI and BIOS support requirements, including BIOS support for USB keyboards and hubs for all system types.
- **Bus and expansion capabilities.** The proposed changes include:
 - Two USB ports (one for mobile PCs).
 - Support PCI 2.1 if PCI bus is present, including the Vaux support and the subsystem ID requirements for buses that remove power to devices during System S3 or Bus B3.
 - No ISA expansion devices or slots. Legacy motherboard implementations such as Super I/O are allowed.
- **Storage and media playback.** A DVD drive is recommended for Consumer and Office systems that provide optical media devices, and DVD is required for Entertainment PCs. IEEE 1394 is recommended for the host controller for secondary storage for desktop systems.
- **Communications.** The proposed changes include:
 - 56-Kbps V.90 modem is required or other public network communication capabilities for Consumer and Entertainment PCs.
 - A network adapter is required for Office PCs and Workstation PCs.
- **Graphics subsystem.** The proposed changes include:
 - AGP is recommended for the primary adapter.
 - Clarifications of graphics adapter support for 3-D hardware acceleration.
 - Monitor must be compliant *Display Data Channel Standard, Version 3.0, Level B (DDC2B)*.

Workstation PC 99 Proposed Requirements

- Proposed performance is equivalent to 400-MHz processor with 256K L2 cache, plus 128 MB RAM.

Entertainment PC Proposed Requirements

- Most features exceeding Consumer PC requirements are described as recommendations, rather than specific feature requirements.
- Entertainment PC capabilities are still defined in terms of specific performance and quality measures.

Mobile PC Proposed Requirements

CHANGED FOR V.0.9

- **Mobile system performance.** Proposed performance is a 233 MHz processor with 128K L2 cache, plus 32 MB RAM. (No L2 cache and 16 MB RAM for mini-notebooks.)
- **Mobile power management.** Many clarifications and changes to improve the definition of power management concerns for this form factor.
- **Mobile graphics subsystem.**
 - Clarification of internal graphics adapter requirements.
 - 3-D features are still recommended, but if implemented, new resolution and performance requirements are defined.
 - Minimum performance requirements if video playback capabilities are implemented.
- **Docking capabilities.** Clarification of requirements for docking capabilities.

Bus Proposed Requirements

Several clarifications and additions are proposed for each bus class. Key items—especially those related to revised industry specifications—include:

- All USB hardware complies with *USB Specification, Version 1.0*.
- All IEEE 1394 hardware, if implemented, complies with IEEE P1394.a standard and OpenHCI specification.
- All PCI components comply with *PCI Local Bus Specification, Revision 2.1*, and all Engineering Change Notices (ECNs) approved as of July 1, 1998, plus clarification to the requirement related to PCI bus power management.
- Clarification to PC Card and CardBus requirements related to required tuples.

Device Class Proposed Requirements

I/O Ports and Devices

- I/O ports and devices clarifications about requirements and recommendations related to IrDA 1.1, IrDA Data, and IrDA Control specifications, plus related USB guidelines. FastIR is required.
- Clarification of the requirement that the system provide a separate, physically-isolated transceiver for each infrared (IR) protocol the system supports.

Graphics Adapters

- Clarification of resolution and local memory minimum requirements.
- Minimum support for one off-screen video overlay surface.

- Programmable blter stride required for 2-D acceleration.
- Clarifications to 3-D hardware acceleration.
- Clarifications to supporting requirement for television output capabilities.
- Requirements for better video scaling.

Video and Broadcast Components

- Requirements and recommendations related to support for receipt and MPEG decoding of digital television broadcasts, including absence of banding related to poor scaling methods.
- Recommendation for separation of “receiver” functions from “display” functions, with the two being linked by software running on the host processor.
- Device Bay and other IEEE 1394 devices are introduced as a way of implementing television receiver modules.
- Requirements and recommendations related to generally increased video quality on the PC.

Monitors

- Requirements for monitors to synchronize to valid formats within a specified time.
- Monitors must support *Display Data Channel Standard, Version 3.0*.

Audio

CHANGED FOR
V.0.9

- Several minor adjustments and clarifications. None of the requirements have changed significantly from those presented in Version 0.7.
- Overall incremental changes to audio performance requirements.
- No legacy hardware interfaces for MS-DOS window (legacy interfaces used only in MS-DOS mode).
- Other new requirements to advance scalable audio.

Modems

- Modem supports V.250 AT command set, V.90 analog modem modulation, V.80 synchronous access, and V.8 *bis* call control signaling.
- Voice modem supports ITU V.253.
- Driver-based modems must use a WDM-based driver solution, with new performance criteria recommended.

Network Communications

- Most of the changes to network requirements and recommendations in PC 99 address issues related to providing better performance or higher bandwidth for multimedia-enabled networking and to ensuring easier configuration of the devices and drivers.
- NDIS 5.0 miniports are required for network adapters. The biggest impact of this requirement is the implementation of the drivers for connection-oriented media.
- Voice support requirements are proposed for ISDN devices.

- Revisions and additional details are provided for cable modem and ADSL devices.
- New requirements are defined for infrared devices.
- New requirements and guidelines are provided for home networking.

Printers

NEW FOR V.0.9

- It is recommended that ECP mode be enabled by default on IEEE 1284 printers.
- Daisy-chained parallel port device must be capable of answering Plug and Play requests from the host, and all pass-through devices must comply with IEEE 1284.3.
- USB printers must comply with *Universal Serial Bus Device Class Definition for Printing Devices, Version 1.0*.

Digital Still Image Peripherals

- Driver support must be implemented under the Still Image architecture, with WDM minidrivers required for digital cameras that can create video streams.
- Use of a PC-compatible file system for removable storage.
- Requirements for compatibility with Windows NT 5.0 support and for emerging standards, including TWAIN 1.7.
- IR implementations must be based on the Windows Sockets interface, because IRComm is not supported in Windows NT 5.0.
- Bandwidth management is required for USB imaging devices, including no pre-allocation of bandwidth and a strong recommendation to limit USB bandwidth use to 8 Mbps.